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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,017	02/05/2004	Joseph Z. Lu	I20 06798US	5322

128 7590 11/27/2006

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EXAMINER	
LO, SUZANNE	

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,017	LU, JOSEPH Z.	
	Examiner	Art Unit	
	Suzanne Lo	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/20/06 08/04/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-27 have been presented for examination.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on 11/20/06 and 08/04/06 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the Examiner has considered the IDSs as to the merits.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claim 27 is rejected** under 35 U.S.C. 102(e) as being clearly anticipated by **Repucci et al. (U.S. Patent Application Publication No. 2005/0015205 A1).**

As per claim 27, Repucci is directed to a method, comprising: performing canonical QR-decomposition on a matrix, the canonical QR-decomposition creating an orthogonal matrix and an upper triangular matrix **([0010], [0073], page 8, [0101])**; *using the orthogonal matrix and the upper triangular matrix to at least partially isolate one or more effects of one or more disturbances in a signal* **([0012] and [0096]-[0097])**; wherein the upper triangular matrix has a plurality of values along a diagonal of the upper triangular matrix, each value being greater than or equal to zero, the diagonal lying between an upper left

corner and a lower right corner of the upper triangular matrix as these limitations are the inherent to an upper triangular matrix from a canonical QR-decomposition.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. **Claims 1-4, 11-13, and 18-21 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kadambe (U.S. Patent Application Publication No. 2003/0061035 A1) **in view of Repucci et al. (U.S. Patent Application Publication No. 2005/0015205 A1).**

As per claim 1, Kadambe is directed to a method, comprising: receiving a matrix comprising a first plurality of samples associated with a first signal and a second plurality of samples associated with a second signal, the second signal comprising a first portion associated with the first signal and a second portion associated with at least one disturbance **([0021], mixed signal matrix X)**; and projecting the matrix *using the projected matrix* to at least *partially isolate* the first portion of the second signal from the

second portion of the second signal **([0021], estimate matrix S)** but fails to explicitly disclose projecting the matrix *into an orthogonal space.*

Repucci teaches projecting a matrix into an orthogonal space by performing canonical QR-decomposition on the matrix with an orthogonal matrix and an upper triangular matrix **([0010], [0073], page 8, [0101])**. Kadambe and Repucci are analogous art because they are from the same field of endeavor, modeling and separating mixed signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe with the matrix projection method of Repucci in order to minimize error in the modeled signals **(Repucci, page 8, [0101])**.

As per claim 2, Kadambe the combination of Kadambe and Repucci already discloses the method of claim 1 wherein projecting the matrix comprises performing canonical QR-decomposition on the matrix, the canonical QR-decomposition creating an orthogonal matrix and an upper triangular matrix **([0010], [0073], page 8, [0101])**.

As per claim 3, the combination of Kadambe and Repucci already discloses the method of claim 2, wherein: the upper triangular matrix has a plurality of values along a diagonal of the matrix, each value being greater than or equal to zero; and the diagonal lies between an upper left corner and a lower right corner of the upper triangular matrix as the limitations are the inherent to an upper triangular matrix from a canonical QR-decomposition.

As per claim 4, the combination of Kadambe and Repucci already discloses the method of claim 1, wherein projecting the matrix comprises projecting the first signal along with the second signal **([0021])**.

As per claim 11, Kadambe is directed to an apparatus, comprising: at least one memory operable to store a matrix comprising a first plurality of samples associated with a first signal and a second plurality of samples associated with a second signal, the second signal comprising a first portion

associated with the first signal and a second portion associated with at least one disturbance **([0021], mixed signal matrix X)** but fails to disclose and at least one processor operable to perform canonical QR-decomposition on the matrix, the canonical QR-decomposition creating an orthogonal matrix and an upper triangular matrix, the upper triangular matrix having a plurality of values along a diagonal of the matrix, each value being greater than or equal to zero, the diagonal lying between an upper left corner and a lower right corner of the upper triangular matrix.

Repucci teaches projecting a matrix by performing canonical QR-decomposition on the matrix with an orthogonal matrix and an upper triangular matrix **([0010], [0073], page 8, [0101])**. Kadambe and Repucci are analogous art because they are from the same field of endeavor, modeling and separating mixed signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe with the matrix projection method of Repucci in order to minimize error in the modeled signals **(Repucci, page 8, [0101])**.

As per claim 12, the combination of Kadambe and Repucci already discloses the apparatus of claim 11, wherein performing the canonical QR-decomposition **(Repucci, [0010], [0073], page 8, [0101])** allows the at least one processor to project the matrix so as to at least substantially separate the first portion of the second signal from the second portion of the second signal **(Kadambe, [0021], estimate matrix S)**.

As per claim 13, the combination of Kadambe and Repucci already discloses the apparatus of claim 12, wherein the at least one processor is operable to generate a projection that includes the first signal, the first portion of the second signal, and the second portion of the second signal **(Kadambe, [0021], estimate matrix S)**.

As per claims 18-21, the combination of Kadambe and Repucci is directed to a computer program embodied on a computer readable medium and operable to be executed by a processor, the

computer program comprising computer readable program code for method steps with the same limitations as claims 1-4 and are therefore rejected under the same art combination.

As per claim 26, Kadambe is directed to a system, comprising: a monitored system **(Figure 3, 300, Data Processing System)** operable to receive a first signal and provide a second signal, the second signal comprising a first portion associated with the first signal and a second portion associated with at least one disturbance **([0021], mixed signal matrix X)**; and a controller **(Figure 3, 306, signal processor)** operable to: produce a matrix comprising a first plurality of samples associated with the first signal and a second plurality of samples associated with the second signal **([0021], mixed signal matrix X)**; and decompose the matrix so as to form a projection, and use the projection to at least *partially isolate* the first portion of the second signal from the second portion of the second signal **([0021], estimate matrix S)** but fails to explicitly disclose decompose the matrix as to form a *projection in an orthogonal space.*

Repucci teaches projecting a matrix by performing canonical QR-decomposition on the matrix with an orthogonal matrix and an upper triangular matrix **([0010], [0073], page 8, [0101])**. Kadambe and Repucci are analogous art because they are from the same field of endeavor, modeling and separating mixed signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the system of separating signals of Kadambe with the matrix projection system of Repucci in order to minimize error in the modeled signals **(Repucci, page 8, [0101])**.

5. **Claims 5-7, 14-15 and 22-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kadambe (U.S. Patent Application Publication No. 2003/0061035 A1) in view of Repucci et al. (U.S. Patent Application Publication No. 2005/0015205 A1) **in further view of Ku et al. ("Preconditioned Iterative Methods for Solving Toeplitz-Plus-Hankel Systems").**

As per claim 5, the combination of Kadambe and Repucci is directed to the method of claim 1, but fails to specifically disclose further comprising generating the matrix by: forming a first column Hankel matrix in a first portion of the matrix; and forming a second column Hankel matrix in a first portion of the matrix. Ku teaches forming two column Hankel matrices in a matrix **(page 109, Introduction, 2nd column, 1st paragraph)**. Kadambe, Repucci and Ku are analogous art because they are from the same field of endeavor, solving linear equation systems. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe and Repucci with the matrix generation method of Ku in order to reduce computation complexity and have a stable convergence performance **(Ku, page 109, Introduction, 1st column, 1st paragraph)**.

As per claim 6, the combination of Kadambe, Repucci and Ku already discloses the method of claim 5, wherein: the first column Hankel matrix comprises a backward column Hankel matrix; and the second column Hankel matrix comprises a forward column Hankel matrix **(Ku, page 109, Introduction, 2nd column, 1st paragraph)**.

As per claim 7, the combination of Kadambe, Repucci and Ku already discloses the method of claim 5, wherein: the first column Hankel matrix comprises one of a backward column Hankel matrix and a forward column Hankel matrix; and the second column Hankel matrix comprises one of a backward column Hankel matrix and a forward column Hankel matrix **(Ku, page 109, Introduction, 2nd column, 2nd paragraph)**.

As per claim 14, the combination of Kadambe and Repucci is directed to the apparatus of claim 11, but fails to specifically disclose wherein the at least one processor is further operable to generate the matrix by: forming a first column Hankel matrix in a first portion of the matrix; and forming a second column Hankel matrix in a first portion of the matrix. Ku teaches forming two column Hankel matrices in a matrix **(page 109, Introduction, 2nd column, 1st paragraph)**. Kadambe, Repucci, and Ku are

analogous art because they are all from the same field of endeavor, solving linear equation systems. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe and Repucci with the matrix generation method of Ku in order to reduce computation complexity and have a stable convergence performance **(Ku, page 109, Introduction, 1st column, 1st paragraph)**.

As per claim 15, the combination of Kadambe, Repucci, and Ku already discloses the apparatus of claim 14, wherein: the first column Hankel matrix comprises a backward column Hankel matrix; and the second column Hankel matrix comprises a forward column Hankel matrix **(page 109, Introduction, 2nd column, 1st paragraph)**.

As per claims 22-23, the combination of Kadambe, Repucci and Ku is directed to a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for method steps with the same limitations as claims 5-6 and are therefore rejected under the same art combination.

6. **Claims 8-10, 16-17 and 24-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kadambe (U.S. Patent Application Publication No. 2003/0061035 A1) in view of Repucci et al. (U.S. Patent Application Publication No. 2005/0015205 A1) **in further view of Bechhoefer et al. (U.S. Patent Application Publication No. 2003/0004658 A1).**

As per claim 8, the combination of Kadambe and Repucci is directed to the method of claim 1, but fails to specifically disclose wherein the matrix comprises a first matrix, the first matrix containing a first segment of samples; and further comprising: receiving a second matrix containing a second segment of samples; concatenating the second matrix with an upper triangular matrix associated with the first matrix to form a concatenated matrix; and projecting the concatenated matrix. Bechhoefer teaches concatenating the second matrix with an upper triangular matrix and projecting the resultant matrix **(page**

2, [0011], "solving possible values for adjustment"). Kadambe, Repucci and Bechhoefer are analogous art because they are both from the same field of endeavor, modeling and separating mixed signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe and Repucci with the matrix projection method of Bechhoefer in order to provide adjustments to reduce disturbances **(Bechhoefer, [0003])**.

As per claim 9, the combination of Kadambe, Repucci and Bechhoefer already discloses the method of claim 8, wherein concatenating the second matrix with the upper triangular matrix comprises multiplying values in the upper triangular matrix by a forgetting factor **(Bechhoefer, page 2, [0011], "solving possible values for adjustment" and [0130])**.

As per claim 10, the combination of Kadambe, Repucci and Bechhoefer already discloses the method of claim 8, wherein the at least one disturbance comprises at least one of white noise and colored noise **(Kadambe, [0186])**.

As per claim 16, the combination of Kadambe and Repucci is directed to the apparatus of claim 11, but fails to specifically disclose wherein: the matrix comprises a first matrix, the first matrix containing a first segment of samples; and the at least one processor is further operable to: receive a second matrix containing a second segment of samples; concatenate the second matrix with an upper triangular matrix associated with the first matrix to form a concatenated matrix; and perform canonical QR-decomposition on the concatenated matrix. Bechhoefer teaches concatenating the second matrix with an upper triangular matrix and projecting the resultant matrix **(page 2, [0011], "solving possible values for adjustment")**. Kadambe, Repucci, and Bechhoefer are analogous art because they are all from the same field of endeavor, modeling and separating mixed signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the method of separating signals of Kadambe and Repucci with the matrix projection method of Bechhoefer in order to provide adjustments to reduce disturbances **(Bechhoefer, [0003])**.

As per claim 17, the combination of Kadambe, Repucci, and Bechhoefer already discloses the apparatus of claim 16, wherein the at least one processor is further operable to multiply values in the upper triangular matrix by a forgetting factor **(Bechhoefer, page 2, [0011], "solving possible values for adjustment" and [0130]).**

As per claims 24-25, the combination of Kadambe, Repucci and Bechhoefer is directed to a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for method steps with the same limitations as claims 8-9 and are therefore rejected under the same art combination.

Response to Arguments

7. The 35 U.S.C. 112, 2nd paragraph rejections have been withdrawn due to the amended claims.

8. Applicant's arguments filed 10/20/06 have been fully considered but they are not persuasive.

9. The 35 U.S.C. 101 rejections of claims 1-27 have been maintained. As amended, claims 1-27 still do not produce a useful, tangible, and concrete result. As stated in MPEP 2106,

> In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the final result achieved by the claimed invention is "useful, tangible, and concrete." In other words, the claim must be examined to see if it includes anything more than a 35 U.S.C. 101 judicial exception. *If the claim is directed to a practical application of a 35 U.S.C. 101 judicial exception, USPTO personnel must then determine whether the claim preempts the judicial exception.*
>
> a) "USEFUL RESULT"
> For an invention to be "useful" it must satisfy the utility requirement of section 101. The USPTO's official interpretation of the utility requirement provides that the utility of an invention has to be (i) specific, (ii) substantial and (iii) credible. MPEP § 2107 and Fisher, 421 F.3d at 1372, 76 USPQ2d at 1230 (citing the Utility Guidelines with approval for interpretation of "specific" and "substantial"). *In addition, when the examiner has reason to believe that the claim is not for a practical application that produces a useful result, the claim should be rejected, thus requiring the applicant to distinguish the claim from the three 35 U.S.C. 101 judicial exceptions to patentable subject matter by specifically reciting in the claim the practical application.* In such cases, statements in the specification describing a practical application may not be sufficient to satisfy the requirements for section 101 with respect to the claimed invention. *Likewise, a claim that can be read so broadly as to include statutory and nonstatutory subject matter must be amended to limit the claim to a practical application. In other words, if the specification discloses*

a practical application of a section 101 judicial exception, but the claim is broader than the disclosure such that it does not require a practical application, then the claim must be rejected.

The claims do not enable their *usefulness* to be realized, there is only calculation, generation, and decomposition of matrices and projections and there is no display or tangible output the matrices or projections and thus at best are directed towards software *per se* which is nonstatutory.

10. Applicant's arguments with respect to claims 1, 4, 18, 21, and 26 have been considered but are moot in view of the new grounds of rejection.

11. In response to applicant's argument for claim 29, that Repucci lacks any mention of performing a canonical QR-decomposition on a matrix to create an orthogonal matrix and an upper triangular matrix, where the upper triangular matrix has a "plurality of values" along its diagonal and each value is "greater than or equal to zero", Applicant is further directed to paragraphs **[0010], [0073], and page 8, [0101]** of Repucci cited in the previous office action. Also as noted in the previous office action, Repucci discloses wherein the upper triangular matrix has a plurality of positive values along its diagonal as these limitations are the inherent to an upper triangular matrix from a canonical QR-decomposition. In response to Applicant's argument that Repucci lacks any method of using the orthogonal matrix and the upper triangular matrix to "at least partially isolate one or more effects of one or more disturbances in a signal", Applicant is further directed to paragraphs **([0012] and [0096]-[0097])** of Repucci where the matrix decomposition is used for "noise decorrelation".

12. In response to applicant's arguments against the references individually of the 35 U.S.C. 103 rejections of claims 2-3, 11-13, and 19-20, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

13. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. The prior art made of record is not relied upon because it is cumulative to the applied rejection. These references include:

1. U.S. Patent No. 6,615,164 B1 issued to Gopisetty et al. on 09/02/03.

2. U.S. Patent Application Publication 2004/0071207 A1 issued to Skidmore et al. on 04/16/04.

3. U.S. Patent No. 7,035,357 B2 issued to Bonhomme on 04/25/06.

15. All Claims are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suzanne Lo whose telephone number is (571)272-5876. The examiner can normally be reached on M-F, 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2297. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Suzanne Lo
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SL
11/03/06

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SUPERVISORY PATENT EXAMINER